

closure. After 250,000 years, most waste packages would have failed and other factors become important. Even at 500,000 years after repository closure, waste package degradation is still important. At later times the important parameters would be related to factors that influenced the flow of water in the drifts, especially infiltration and episodic flow.

### 5.3 Locations for Impact Estimates

Yucca Mountain is in the transition area between the Mojave Desert and the Great Basin. This is a semiarid region with linear mountain ranges and intervening valleys, with rainfall averaging between about 100 and 250 millimeters (4 and 10 inches) a year, sparse vegetation, and a small population. Although there is low infiltration of water through the mountain and no people currently live in the land withdrawal area, radioactive and chemically toxic materials released from the repository could affect persons living closer to the proposed repository in the distant future. This section describes the regions where possible human health impacts could occur.

Figure 5-3 is a map with arrows showing the general direction of groundwater movement from Yucca Mountain. Shading indicates major areas of groundwater discharge through a combination of springs and evapotranspiration by plants. The general path of water that infiltrates through Yucca Mountain is south toward Amargosa Valley, into and through the area around Death Valley Junction in the lower Amargosa Desert. Natural discharge of groundwater from beneath Yucca Mountain probably occurs farther south at Franklin Lake Playa (DIRS 100376-Czarnecki 1990, pp. 1 to 12), and spring discharge in Death Valley is a possibility (DIRS 100131-D'Agnese et al. 1997, pp. 64 and 69).

Although groundwater from the Yucca Mountain vicinity flows under and to the west of Ash Meadows in the volcanic tuff or alluvial aquifers, the surface discharge areas at Ash Meadows and Devils Hole (see map in Figure 5-3 for locations) are fed from the carbonate aquifer. While these two aquifers are connected at some locations, the carbonate aquifer has a hydraulic head that is higher than that of the volcanic or alluvial aquifers. Because of this pressure difference, water from the volcanic aquifer does not flow into the carbonate aquifer; rather, the reverse occurs. Therefore, contamination from Yucca Mountain is not likely to mix with the carbonate waters and discharge to the surface at Ash Meadows or Devils Hole (DIRS 104983-CRWMS M&O 1999, all) under current conditions. This pressure difference could change under future climate conditions.

Because, under expected conditions, there would be no contamination of this discharge water, there would be no human health impacts. Furthermore, there would be no consequences to the endangered Ash Meadows Amargosa pupfish (*Cyprinodon nevadensis mionectes*) or Devils Hole pupfish (*Cyprinodon diabolis*) at those locations.

Figure 3-25 in Chapter 3 shows the projected population of 76,000 residents within 80 kilometers (50 miles) of Yucca Mountain in 2035. This map provides the information used to estimate population doses from radionuclides released to the atmosphere from the repository. The atmospheric analysis in Section 5.5 used the 80-kilometer (50-mile) population distribution described in Section 3.1.8.

In the Draft EIS, impacts were evaluated at 5-kilometer (3-mile), 20-kilometer (12-mile), and 30-kilometer (19-mile) distances from the repository as well as at the groundwater discharge point. The EPA regulation, 40 CFR 197.12, establishes a controlled area around the repository that must not extend farther south than 36 degrees, 40 minutes, 13.6661 north latitude, in the predominant direction of groundwater flow. For this EIS, DOE assumed the controlled area boundary to be the farthest point south. The predominant groundwater flow crosses this boundary approximately 18 kilometers (11 miles) from the repository. Therefore, the 5-kilometer (3-mile) distance would be inside the controlled area, would no longer be part of the accessible environment, and DOE did not evaluate impacts at this distance.

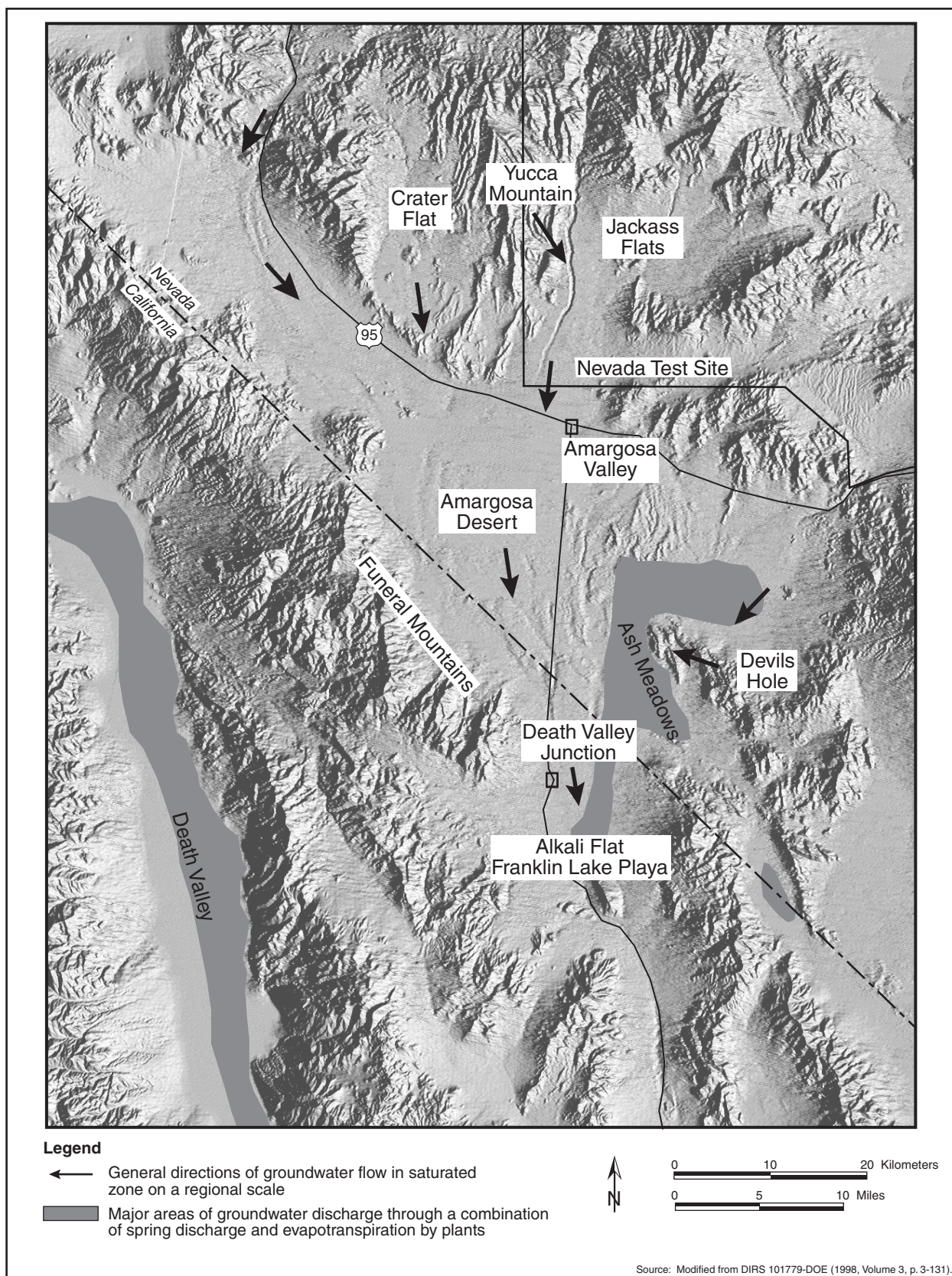


Figure 5-3. Map of the saturated groundwater flow system.